



**APPENDIX B.**

**EROSION AND  
SEDIMENT CONTROL**

**GUIDELINES  
2022**

*The Community of Choice*

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# SECTION I. INTRODUCTION

## 1.1 OBJECTIVE

This document aims to:

Provide developers, consultants, and contractors a unified guidance of the City's expectations relating to Erosion and Sediment Control on Land Development projects

## 1.2 BACKGROUND

*Erosion* – is the transport of soil particles by water, wind, or gravity, causing deterioration of the ground surface

*Sediment* – is the soil particles suspended or settled in water typically at a lower ground elevation

*Silt* – is fine soil particles of a size between sand and clay carried by water and deposited as sediment

*Erosion and Sediment Control* – eliminating, minimizing, and managing causes and effects of erosion and sediment occurrence

✓ Eliminate – Remove the cause

- Develop an area immediately after stripping
- Avoid over stripping
- Phase a development so that it can be fully completed by end of one construction season
- Avoid partial grading prior to underground so that site can drain as designed for the duration of construction
- Haul offsite when possible rather than stock piling on site
- Start landscaping a SWMF immediately after grading

- ✓ Minimize – Control the cause
  - Observe site housekeeping
  - Set stockpile locations away from water bodies
  - Reclaim stripped areas outside development
  - Soil coverage or stabilization
  - Drain a construction site away from adjacent SWMF
  
- ✓ Manage – Mitigate the effect
  - Provide thorough ESC plans during drawing review and ensure implementation during construction
  - Verify measures are sufficient
  - Install measures and address deficiencies in a timely manner
  - Regular maintenance
  - Regular inspection and reporting
  - Communicate and control third party damages

### **1.3 CITY DOCUMENTS**

This guideline shall not in any way be utilized to dispute any text contained in other City documents. Related references are listed below.

- Surface Drainage Bylaw C-1045-18
- Land Use Bylaw C-824-4
- Construction Site Cleanliness Bylaw C-976-16
- Municipal Development Standards

## SECTION II. EROSION AND SEDIMENT CONTROL DRAWINGS

ESC plans must be prepared and stamped by a Certified Professional in Erosion and Sediment Control (CPESC), or a Professional Agrologist (Pag), or a registered Professional Engineer (P. Eng).

As outlined on the City's Municipal Development Standards, drawings must contain the following information.

### 2.1 Limits of soil disturbance

Plans must clearly identify boundaries of:

- Development
- Stripping outside of development
- Grading outside of development
- Reclamation

**In case of a pre-grading program that is approved by the City through a Development Permit, a grading ESC plan/s will be required showing limits accordingly.**

#### 2.1.1. Idle Site Management

Pre-stripped or pre-graded areas will be considered idle when no further construction occurs after thirty (30) days of grading. Idle site management is required for any idle exposed areas in accordance with the requirements listed on the table below.

**Short-Term Cover:** Is defined as a control that has a defined lifespan and must be reapplied; examples include blankets, mulches, and tackifiers.

**Long-Term Cover:** Is defined as a control that, once installed, will continue to provide cover with limited or no reapplication; examples include vegetated cover such as sod or established seed.

Water Management Plan: Is defined as a plan that outlines how water will be retained and managed on site.

| <b>Idle Site Management Requirements</b>                                |                                                                                                                                                                                                                       |                                 |
|-------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|
| <b>Overall Site Size</b><br><i>(Section 1.6 of the ESC Application)</i> | <b>Days Idle</b>                                                                                                                                                                                                      |                                 |
|                                                                         | <b>30 – 364 days</b>                                                                                                                                                                                                  | <b>365 days or more</b>         |
| <b>0 – 2 ha</b>                                                         | <b>No Short-Term Cover required</b>                                                                                                                                                                                   | <b>Long-Term cover required</b> |
| <b>2+ - 10 ha</b>                                                       | <b>1) Short-Term cover</b><br><u><b>or</b></u><br><b>2) Water Management Plan</b>                                                                                                                                     | <b>Long-Term cover required</b> |
| <b>10+ ha</b>                                                           | <b>1) Short-Term cover</b><br><u><b>or</b></u><br><b>2) Water Management Plan</b><br><u><b>and</b></u><br><b>Limited Exposure Plan</b><br><b>*If a site has more than 10ha exposed, short-term cover is triggered</b> | <b>Long-Term cover required</b> |

## 2.2 Construction details

2.2.1 ESC measures to be accompanied with:

- a. Detail drawing (plan and profile as needed)
- b. Installation notes (e.g., spacing recommendations)
- c. Time of install and removal if not for entire phase

2.2.2 ESC Drawing general information:

- a. Construction phase/s
- b. Projected start and end dates when available
- c. Direction of slopes and drainage flow
- d. RUSLE-FAC calculations table
- e. Appropriate and sufficient Erosion and Sediment Control

### 2.2.3 Phased ESC drawings:

| <b>STRIPPING AND GRADING</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>This plan is intended to reflect existing conditions onsite and surrounding areas prior to and during grading operations.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <p>When applicable, this plan shall include:</p> <ul style="list-style-type: none"><li>• Existing ground contours</li><li>• Stripping limits</li><li>• Grading limits</li><li>• Adjacent perimeter elevations</li><li>• Cut/fill marks (may be submitted on a separate sheet)</li><li>• Adjacent development</li><li>• Adjacent undeveloped land</li><li>• Existing storm infrastructure</li><li>• Surrounding critical areas and environmentally sensitive bodies</li><li>• Tree line</li><li>• Tree clearing limits</li><li>• Site access</li><li>• Existing stockpiles</li><li>• Proposed stockpiles</li><li>• Haul routes</li><li>• Site (sediment) storage</li></ul> |
| <p><b>This plan is to be submitted for review following Approved for Construction Engineering Drawings or a Development Permit application.</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |



## CONSTRUCTION COMPLETION

At this stage, all permanent measures are expected to be installed. Temporary measures may still be required and should be indicated. Areas to be landscaped by others should be identified.

If at end of season construction is not completed, a revised ESC plan for Interim Construction Completion may be required accordingly.

When applicable, plans shall include:

- Means of establishing turf (e.g., broadcast seeding, sodding, hydroseeding)
- Remaining stockpiles
- Temporary ditches
- Restoration areas
- Catch basin protection

**This plan is to be submitted for review with the Engineering Drawings.**

### 2.3 Existing storm infrastructure

All surrounding natural and/or constructed storm bodies must be reflected on the Grading phase plan and shall remain on subsequent plans if downstream from site and/or still affected by or relevant to construction. This may include:

- Catch basins
- Inlets/outlets
- SWMF
- French drain
- Swales
- Ditches
- Creek
- Fen

- Wetland

## 2.4 Erosion Control Matting

Slopes steeper than 4:1 will require matting except when submerged in water (SWMF).

Depending on application and intended duration of service, different types of matting are commercially available including:

- Straw
- Coconut
- Coir
- Polypropylene
- GeoJute

## 2.5 Stabilized Site Access

**Gravel bed is to be constructed to a minimum of 20m long x 4m wide at site exits.**

Other stabilization methods can be used upon approval by the City (e.g., rig mats, bamboo matting) and must be labeled and clearly identified on ESC plans.

## 2.6 Stockpiles

Stockpile information to be noted on ESC plans include:

- Location
- Approximate dimensions
- Estimated volume
- Type of material
- Duration of storage
- Haul route

## **2.7 Landscaping and Permanent Measures**

Details for landscaping and permanent measures must be identified on the Construction Completion stage ESC plan.

Permanent measures may include:

- Riprap
- Final landscaping
- Pavement
- Restoration

When necessary, long term temporary measures during maintenance periods may include:

- Soil tackifier
- Matting
- Furrowing
- Site (sediment) storage
- CB socks
- Regular road sweep
- Silt fence
- Topsoil and seeding

## SECTION III. RUSLE-FAC CALCULATION

The Revised Universal Soil Loss Equation for Application in Canada (RUSLE-FAC) can be used to determine if measures are sufficient based on estimated soil loss.

Equation:  
$$A = R * K * LS * C * P$$

1. Annual estimated soil loss, (A)

Calculated A from the equation must be less than the standard allowable:

$$A_{(\text{allowable})} = 2 \text{ tonnes / hectare / year}$$

2. Rainfall and Runoff Factor, (R)

The R-value is a numerical representation of rainfall erosivity. Based on isoerodent map of R values for the Prairie Region shown in Figure 1, use R value for Spruce Grove:

$$R = 350$$

3. Soil erodibility Factor, (K)

K-value is a quantitative measure of a soil's inherent susceptibility/resistance to erosion and the soil's influence on runoff amount and rate.

To determine K value, gather information below from the geotechnical report and plot on the nomograph shown on Figure 2 in the same sequence:

1. Percent silt + percent very fine sand
2. Percent sand between 0.10-2.0 mm
3. Percent organic matter
4. Soil structure
5. Permeability

If Soil structure and Permeability are not available, estimates can be taken from Figures 3-1 and 3-2, respectively, based on percent clay and percent sand.

If any other information listed above is not available and K value cannot be determined using the nomograph, use conservative default value: **K = 0.079**

#### 4. The Slope Factor, (LS)

LS is a measure of the effects of slope angle, length, and complexity on erosion.

Use the table in Figure 4 to find or interpolate the LS value based on slope and slope length. The table is suitable for high ratio of rill: inter-rill erosion which best describes most construction sites.

#### 5. The Cover and Management Factor, (C)

C-value is a measure of the relative effectiveness of soil cover systems in preventing or reducing soil loss.

Provide C-value from manufacturer for management practices such as hydroseed, tackifier, mulch, and so on. Some typical values are:

|                    |                 |
|--------------------|-----------------|
| Sod,               | <b>C = 0.01</b> |
| Wood chips,        | <b>C = 0.06</b> |
| Broadcast seeding, | <b>C = 1.0</b>  |
| No cover,          | <b>C = 1.0</b>  |

#### 6. The Support Practice Factor, (P)

P-value accounts for the erosion control effectiveness of support practices.

For control measures such as silt fence and straw wattles, provide P-value from manufacturer. For constructed practices:

|                    |                                                  |
|--------------------|--------------------------------------------------|
| Contour furrowing, | <b>P = 0.6</b>                                   |
| Storage,           | <b>P = 0.1</b> (minimum 250 m <sup>3</sup> / ha) |

## **SECTION IV. CONSTRUCTION**

### **4.1 Startup**

All ESC plans must be approved by this time. At the pre-construction meeting, the following must be established:

- a. Installation responsibility
- b. Maintenance responsibility
- c. Reporting responsibility
- d. Date of install
- e. Review of the Grading Phase ESC plan with all involved parties
- f. Stabilized site access details
- g. Dust control responsibility and point of contact for resident complaints
- h. Mud tracking control responsibility and point of contact for resident complaints
- i. Conditions of existing infrastructure at site accesses

### **4.2 Pumping**

Whether overland or into a storm infrastructure, any pumping within the City must adhere to the following conditions:

- a. Notify the City prior to pumping
- b. Adequate dewatering bags made of geotextile fabric are required
- c. If pumping overland, discharge to an open area directed towards a drainage ditch. Do not discharge directly to a City owned ditch
- d. If pumping to sewer, discharge on the gutter directed towards a catch basin. Do not pump directly to a catch basin or manhole
- e. Filtration system must be attached to the pump at the receiving end
- f. Chlorinated water must be dechlorinated before discharge
- g. Under no circumstances should there be any discharge to a fen
- h. All pumping must be continuously monitored throughout the duration
- i. If any sign of erosion and/or sediment transport arise, pumping must be ceased immediately and re-evaluated

### 4.3 Stripping and Grading

**4.3.1 Existing Ground:** Measures specified on Grading phase ESC drawing must be in place prior to stripping. Downstream areas must be protected throughout the grading program.

**4.3.2 Limits:** Boundaries must be in accordance with approved engineering drawings and ESC plans. If an extension is approved through a Development Permit, an updated ESC plan must be submitted. Measures must be in place accordingly prior to stripping the extension.

**4.3.3 Perimeter Elevations:** Where perimeter elevation does not match adjacent area, an abrupt rise or drop shall be avoided by a temporary gradual slope (e.g., berm), which may have to be established with vegetation depending on duration.

**4.3.4 Cut/Fill:** Cuts and Fills on the plan must be differentiated by font colors and a minus (-) sign for cuts. Maximum grid spacing shall be 15m x 15m but shall be set closer as needed.

#### **4.3.5 Adjacent bodies:**

- a. Homes/Commercial/SWMF: No drainage and no sediment allowed. A temporary berm or ditch along perimeter must be placed to intercept drainage and sediment until grading and landscaping are completed.
- b. Paved roads: No sediment allowed. Existing catch basins must be protected from sediment. Mud tracking shall be closely monitored.
- c. Private land: May be used for drainage and sediment storage only if owned by the same developer or otherwise permitted by owner.
- d. Public land: No sediment allowed. ESC measures at perimeter shall be installed and maintained regularly.

**4.3.6 Tree line:** Existing tree line must be shown on plans as well as the new or proposed tree line for any areas with tree clearing operations. Tree line must be protected from sediment transport throughout the project unless evidently upstream and will remain upstream.

**4.3.7 Site access:** Exits to public roads must be stabilized according to Section 2.5 and shall be established at beginning of construction or prior to any offsite hauling and onsite delivery.

Site access and the adjacent public roads shall be regularly maintained and monitored as part of the ESC inspections.

**4.3.8 Stockpiles and haul routes:** Notify the City of any changes to the information specified on the ESC plans outlined on Section 2.6. Dust control must be observed on stockpiles and haul routes to and from the piles.

A stockpile is considered dormant once hauling in or out has ceased.

**Dormant stockpiles to be stored onsite for more than forty-five (45) days must be covered or stabilized.**

**4.3.9 Site sediment storage:** Could be a small pond or a ditch designated to collect and/or intercept sediment from leaving site. When 1/3 of the height is reached, storage must be emptied. It can be hauled offsite or re-used onsite as marginal if suitable for berms and such.

#### **4.4 Intermediate Phases**

For any or all intermediate phases such as underground, surface and shallows:

- a. If any grading items still exist, appropriate measures must be continued throughout the phase/s.
- b. Pumping water off the trench and into the sanitary or storm system, including newly connected main and service lines, must adhere to the conditions outlined in Section 3.2.
- c. Site entrance must remain stabilized until surface construction begins
- d. Transferring responsibility for dust control and mud tracking between contractors must be specified and communicated to all parties
- e. After underground utilities have been installed, contractor that grades the site back to rough grade shall create **contour furrowing** on the lots as included in Section 3.6.



- f. Concrete slurry shall not enter the City's system or be released to the environment. Concrete dumps must be contained and lined locally until hardened concrete can be hauled offsite.

#### **4.5 Construction Completion and Maintenance**

**All required ESC measures must be in place prior to freeze up.**

Major concerns during maintenance periods that fall under developer responsibility include:

- a. Builder damages on established back of lot ESC measures
- b. Builder mud tracking on paved roads
- c. Unestablished turf on SWMF slopes
- d. Unprotected long term temporary ditch
- e. Drainage around temporary turnarounds
- f. Overflow to undeveloped area downstream from end of pavement

#### **4.6 Catch basin protection**

Protection must be in place according to approved ESC drawings right after construction completion and until end of maintenance as outlined in Section 4.7. Catch basin protections are to be:

- a. Removed in the fall right before freeze/snow or as directed by the City
- b. Re-installed at spring cleanup right after thaw or as directed by the City.

#### **4.7 End of Maintenance**

**Developers and owners are responsible for ESC until all improvements have been issued FAC, including Landscaping, except when there is no SWMF within or adjacent to the stage, and when the City is in full agreement, then ESC responsibility may be ceased at the issuance of a complete Surface FAC.**

Regular inspection and reporting frequency may be reduced to bi-weekly submissions upon issuance of the Underground FAC.

## SECTION V. INSPECTION AND REPORTING

- 5.1 Qualification:** Inspections must be completed by a trained individual who is certified or is under direct supervision of a certified CISEC.
- 5.2 Regular inspection:** Every 7 days or as conditioned in Section 4.7.
- 5.3 Critical inspection:** Within 24 hours of a heavy storm event (20mm or more), thaw or as deemed necessary. May be submitted in lieu of the regular inspection if the regular frequency is still met.
- 5.4 Reporting:** Must be submitted within 48 hours of inspection.
- 5.5 Winter reporting:** Essential inspections required. Regular inspections and reporting may cease in the winter unless deemed necessary.
- 5.6 Reports:** Must include, at minimum, the following information.
- a. Date of inspection
  - b. Date of last inspection
  - c. Name and company of inspector
  - d. Subdivision and Stage
  - e. Current weather
  - f. Recent precipitation in mm
  - g. Current phase of construction
  - h. Inspection checklist
  - i. Observations – detailed description with date stamped photos
  - j. Action Items – detailed description with date stamped photos
  - k. Site plan – use phased ESC plans accordingly
- 5.7 Inspection checklist:** Must include, at minimum, the following information.
- a. Have stripped areas/exposed soils/steep slopes been protected and/or stabilized?
  - b. Have waterways and drainage ways been protected and stabilized?
  - c. Are perimeter controls in place and functioning adequately?
  - d. Are offsite/downstream properties/waterways protected?
  - e. Are construction entrances stabilized?
  - f. Are Sediment controls in place and functioning adequately?
  - g. Are Transport controls in place and functioning adequately?
  - h. Are Erosion controls in place and functioning adequately?

## SECTION VI. RECOMMENDED PRACTICES

- 6.1 J-hooks:** Instead of a straight line, turn inward at an effective interval to avoid concentrated flow parallel to the line of install and also provide better storage.



- 6.2 Contour Furrowing:** Creating furrows and ridges against the direction of slope to reduce soil erosion and to trap sediment, particularly useful for lots backing onto SWMF.



**6.3 Check dams:** Installed along ditches to reduce velocity, improve storage mechanism, and trap sediments.



**6.4 Rock check dams:** Check dams built with rocks to help reduce velocity and filter sediment along ditches.



**6.5 Hydroseeding:** speeds up germination process for faster and fuller vegetation establishment.





## SECTION VII. FIGURES

**Figure 1.** Isoerodent map showing R values for the Prairie Region (Agriculture and Agri-Food Canada, 2002)

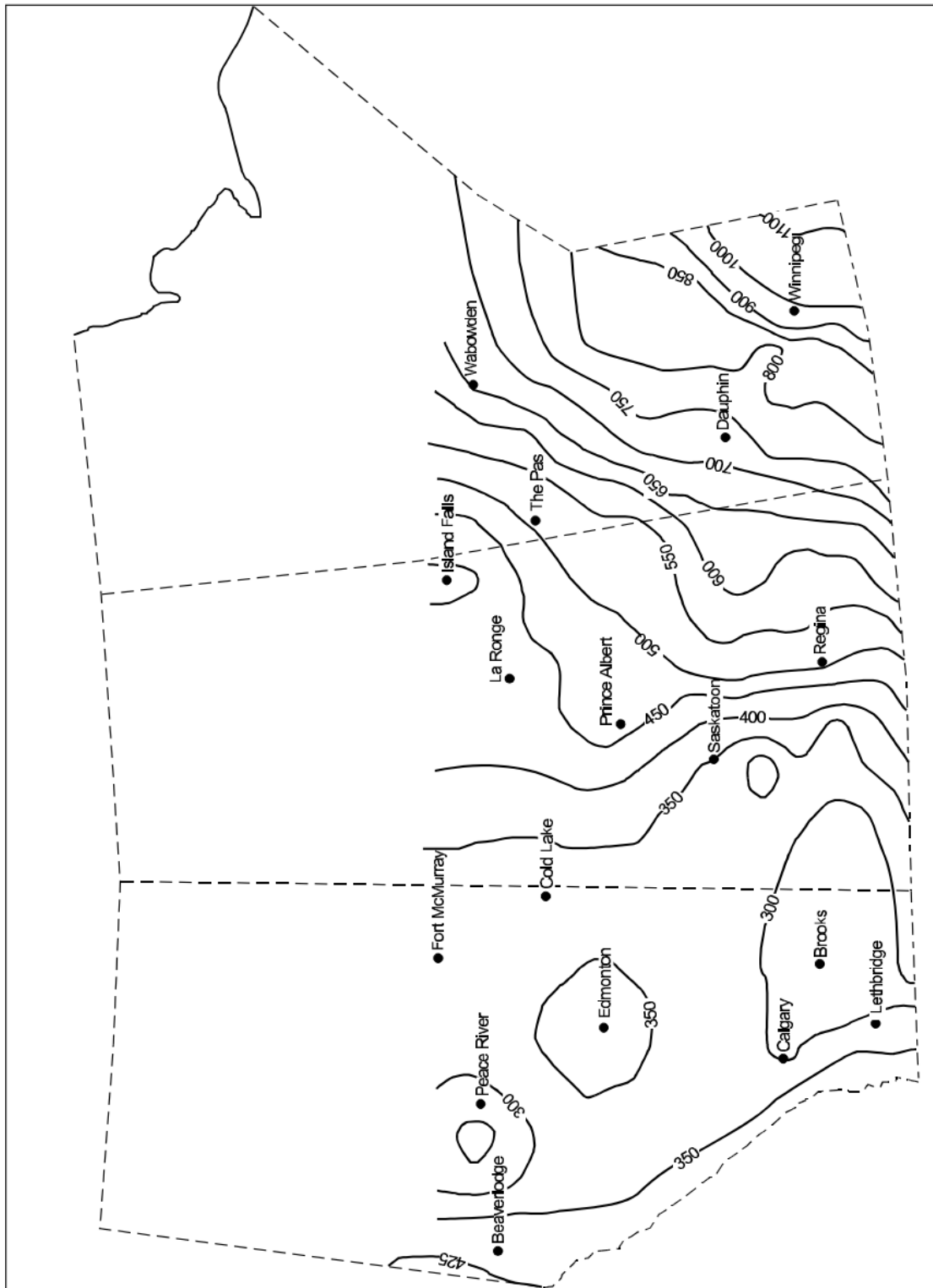
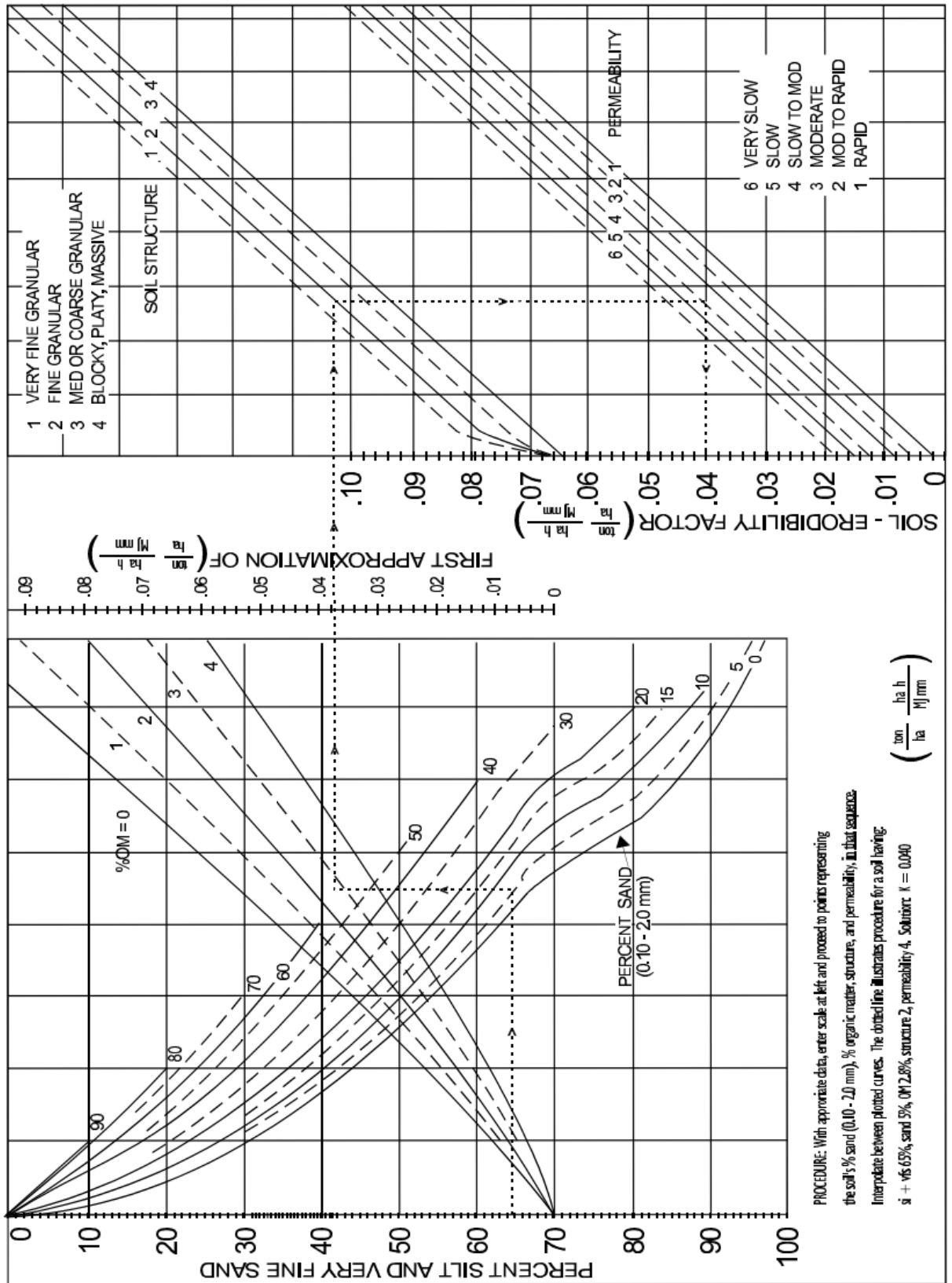
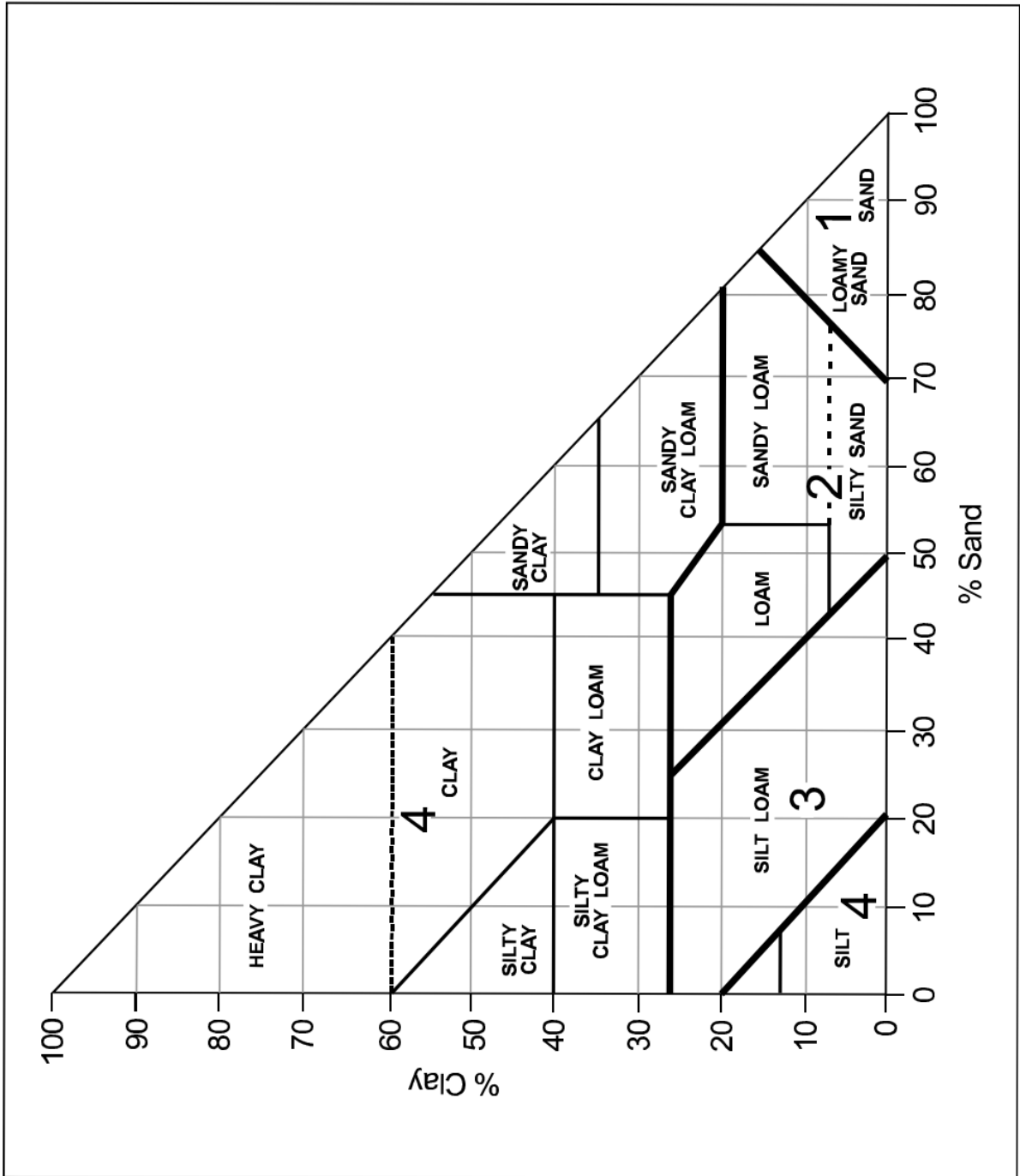


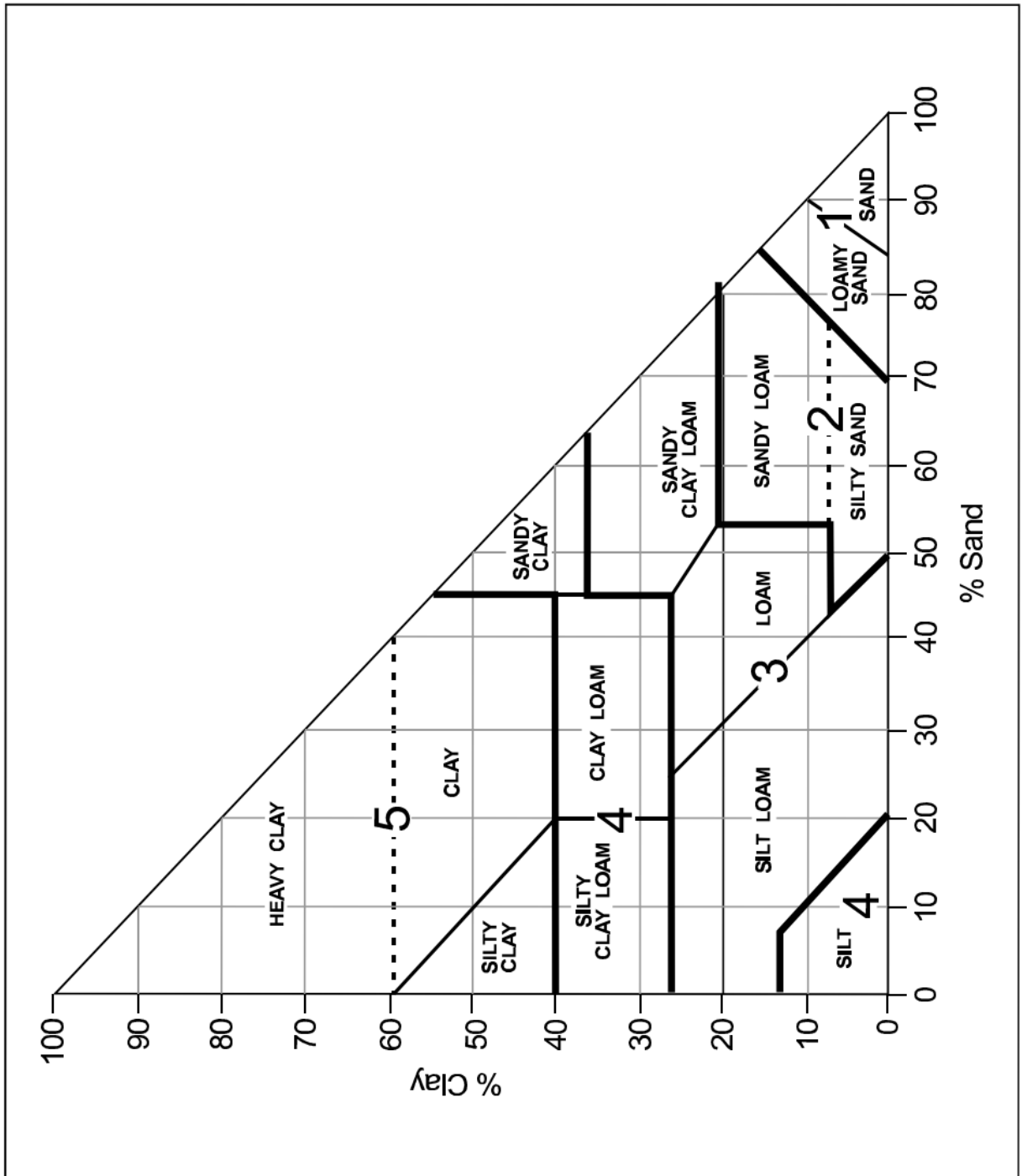
Figure 2. Soil erodibility nomograph (Foster et al., 1981)



**Figure 3-1.** Structure code based on textural classification (Ontario Centre for Soil Resource Evaluation, 1993)



**Figure 3-2.** Permeability code based on textural classification (Ontario Centre for Soil Resource Evaluation, 1993)



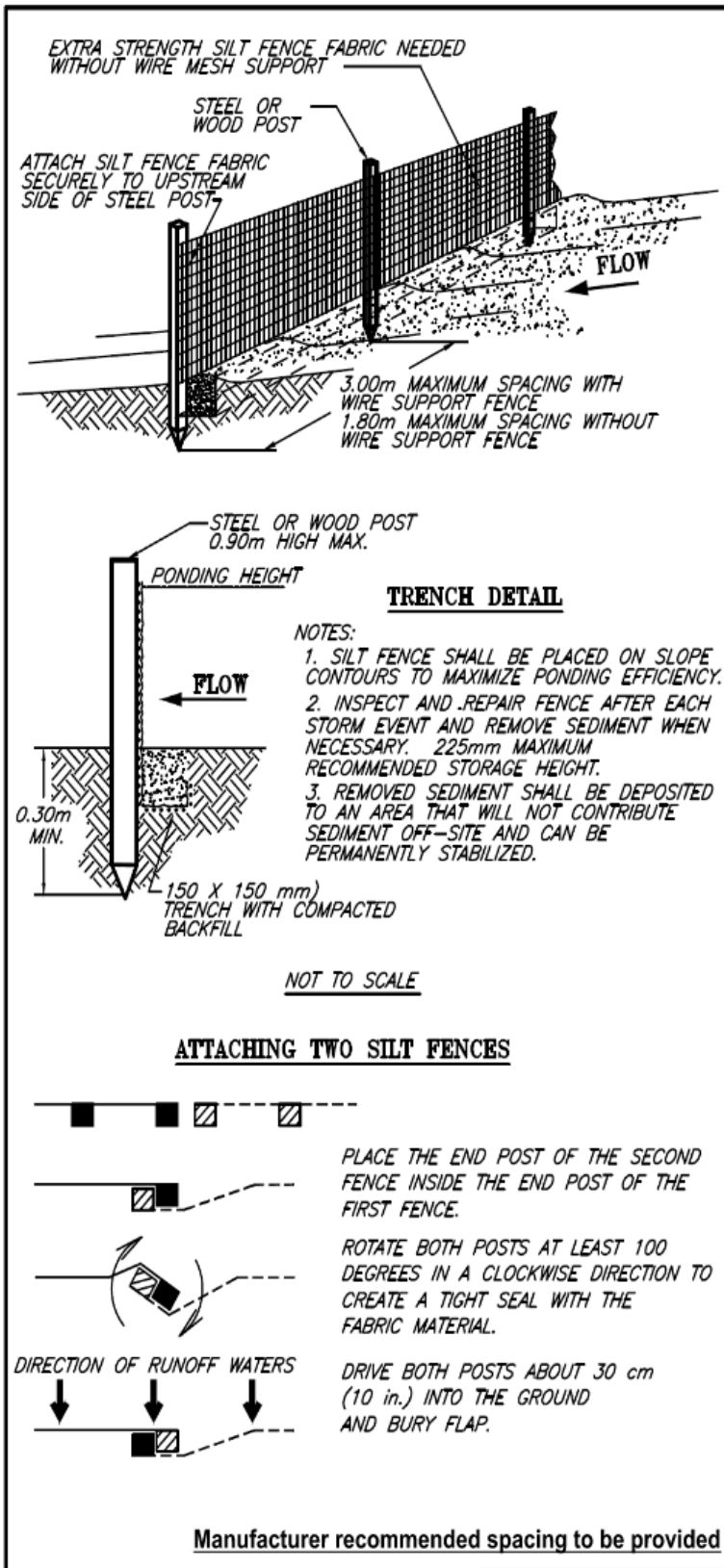


**Figure 4.** LS for high ratio of rill:inter-rill erosion, such as highly disturbed soil conditions and freshly prepared construction sites, with little or no cover (not applicable to thawing soils), (Agriculture and Agri-Food Canada, 2002)

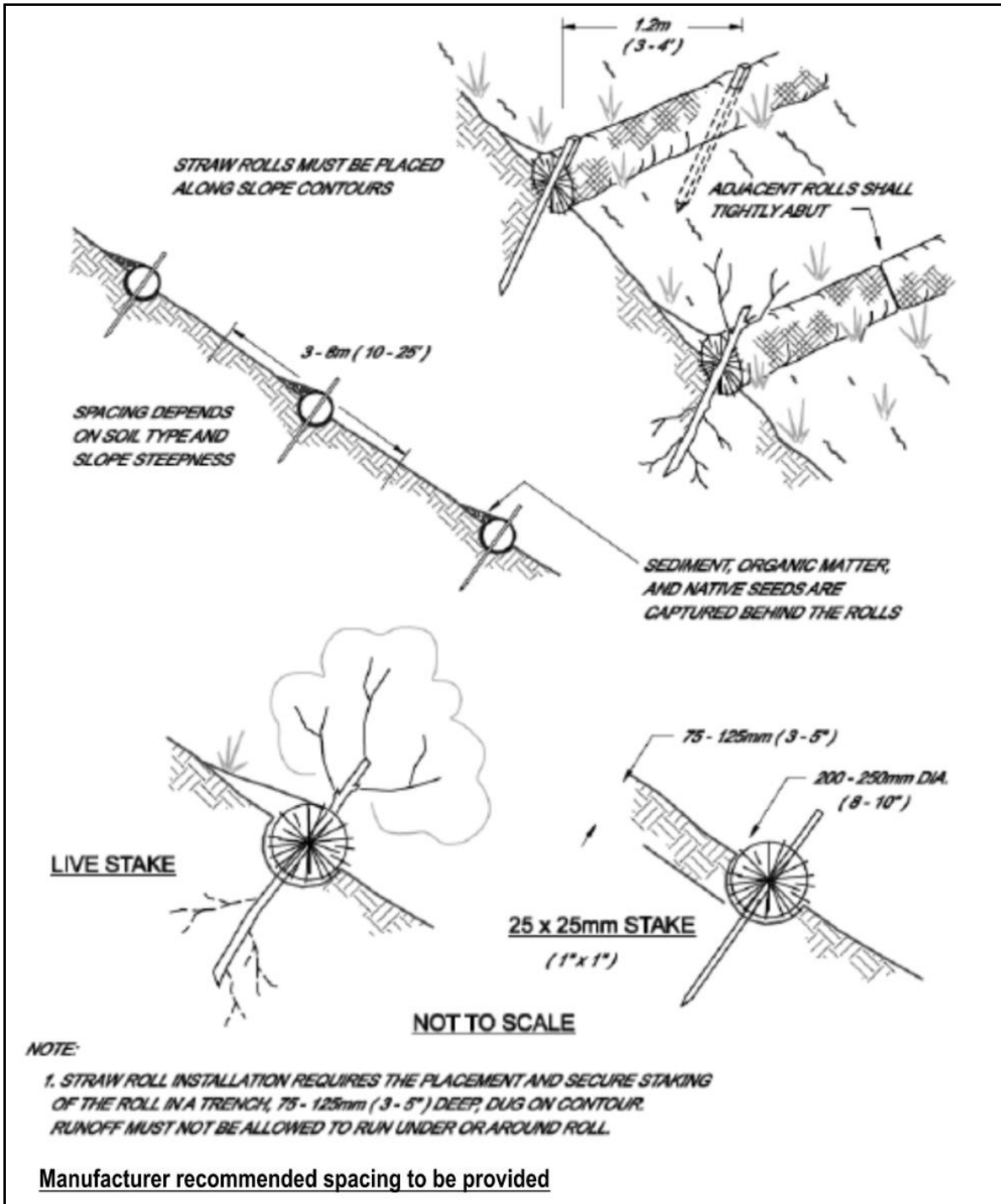
| Slope Length in metres |      |      |      |      |      |      |      |       |       |       |       |       |       |       |
|------------------------|------|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|
| Slope %                | 1    | 2    | 4.57 | 5    | 10   | 15   | 25   | 50    | 75    | 100   | 150   | 200   | 250   | 300   |
| 0.2                    | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05  | 0.06  | 0.06  | 0.06  | 0.06  | 0.06  | 0.06  |
| 0.5                    | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.09 | 0.10  | 0.10  | 0.11  | 0.11  | 0.12  | 0.12  | 0.13  |
| 1                      | 0.09 | 0.09 | 0.09 | 0.09 | 0.11 | 0.12 | 0.14 | 0.17  | 0.19  | 0.20  | 0.23  | 0.24  | 0.26  | 0.27  |
| 2                      | 0.13 | 0.13 | 0.13 | 0.14 | 0.18 | 0.21 | 0.26 | 0.34  | 0.40  | 0.44  | 0.52  | 0.58  | 0.64  | 0.68  |
| 3                      | 0.17 | 0.17 | 0.17 | 0.17 | 0.24 | 0.29 | 0.37 | 0.52  | 0.63  | 0.72  | 0.88  | 1.01  | 1.12  | 1.22  |
| 4                      | 0.20 | 0.20 | 0.20 | 0.21 | 0.30 | 0.38 | 0.49 | 0.71  | 0.88  | 1.03  | 1.28  | 1.49  | 1.67  | 1.84  |
| 5                      | 0.23 | 0.23 | 0.23 | 0.24 | 0.36 | 0.46 | 0.61 | 0.91  | 1.14  | 1.35  | 1.70  | 2.01  | 2.28  | 2.53  |
| 6                      | 0.26 | 0.26 | 0.26 | 0.28 | 0.42 | 0.54 | 0.73 | 1.11  | 1.42  | 1.68  | 2.15  | 2.56  | 2.93  | 3.27  |
| 7                      | 0.29 | 0.29 | 0.29 | 0.31 | 0.48 | 0.61 | 0.85 | 1.31  | 1.69  | 2.03  | 2.62  | 3.14  | 3.61  | 4.05  |
| 8                      | 0.32 | 0.32 | 0.32 | 0.34 | 0.53 | 0.69 | 0.96 | 1.51  | 1.97  | 2.38  | 3.09  | 3.73  | 4.31  | 4.86  |
| 9                      | 0.35 | 0.35 | 0.35 | 0.37 | 0.59 | 0.78 | 1.09 | 1.73  | 2.27  | 2.75  | 3.61  | 4.37  | 5.08  | 5.73  |
| 10                     | 0.35 | 0.36 | 0.40 | 0.42 | 0.68 | 0.90 | 1.27 | 2.04  | 2.69  | 3.28  | 4.32  | 5.26  | 6.13  | 6.94  |
| 12                     | 0.36 | 0.40 | 0.49 | 0.53 | 0.86 | 1.14 | 1.64 | 2.67  | 3.56  | 4.36  | 5.80  | 7.11  | 8.32  | 9.46  |
| 14                     | 0.38 | 0.44 | 0.58 | 0.62 | 1.03 | 1.38 | 2.00 | 3.30  | 4.43  | 5.45  | 7.32  | 9.01  | 10.59 | 12.09 |
| 16                     | 0.39 | 0.47 | 0.67 | 0.72 | 1.20 | 1.62 | 2.36 | 3.93  | 5.31  | 6.57  | 8.86  | 10.96 | 12.92 | 14.79 |
| 20                     | 0.41 | 0.53 | 0.84 | 0.90 | 1.53 | 2.08 | 3.07 | 5.20  | 7.07  | 8.81  | 11.99 | 14.92 | 17.69 | 20.32 |
| 22                     | 0.43 | 0.57 | 0.92 | 0.99 | 1.69 | 2.31 | 3.42 | 5.82  | 7.95  | 9.93  | 13.56 | 16.92 | 20.09 | 23.11 |
| 25                     | 0.45 | 0.62 | 1.04 | 1.12 | 1.92 | 2.64 | 3.93 | 6.75  | 9.26  | 11.59 | 15.91 | 19.91 | 23.70 | 27.32 |
| 30                     | 0.48 | 0.69 | 1.24 | 1.33 | 2.30 | 3.18 | 4.77 | 8.26  | 11.40 | 14.33 | 19.77 | 24.84 | 29.65 | 34.27 |
| 40                     | 0.53 | 0.83 | 1.59 | 1.71 | 3.01 | 4.19 | 6.34 | 11.13 | 15.46 | 19.53 | 27.15 | 34.30 | 41.11 | 47.67 |
| 50                     | 0.58 | 0.95 | 1.91 | 2.06 | 3.65 | 5.09 | 7.75 | 13.72 | 19.17 | 24.29 | 33.93 | 43.00 | 51.68 | 60.05 |
| 60                     | 0.63 | 1.07 | 2.19 | 2.36 | 4.21 | 5.89 | 9.01 | 16.04 | 22.48 | 28.55 | 40.00 | 50.82 | 61.18 | 71.20 |

Source: RUSLEFAC Handbook, Agriculture Canada (modified by: Joe Buchner, CPESC)

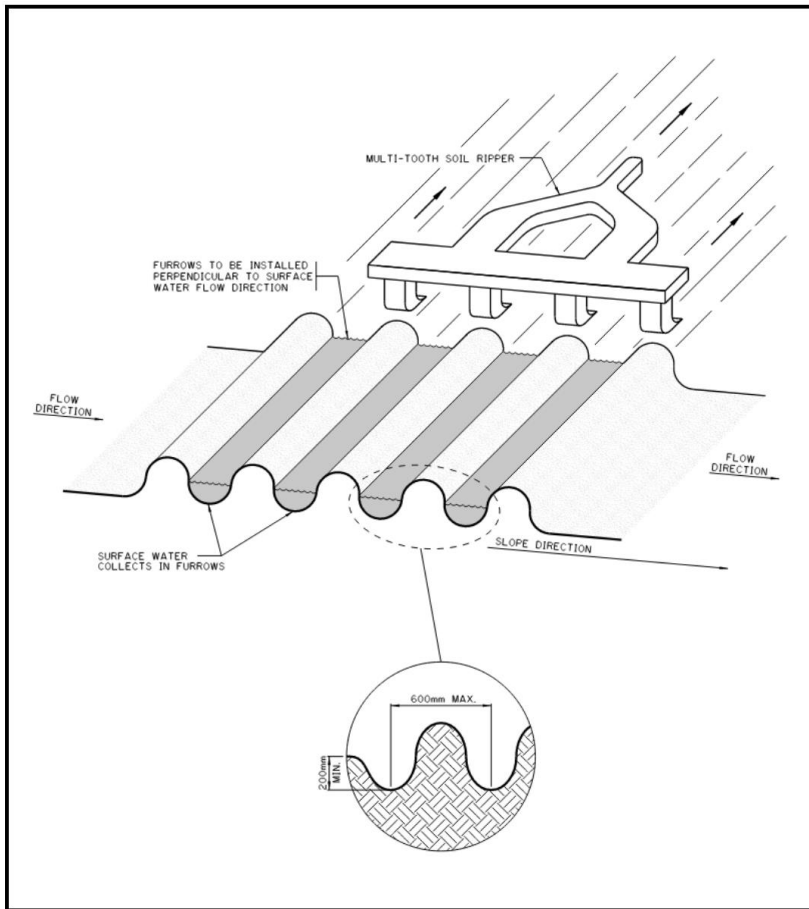
**Figure 5. Silt Fence**



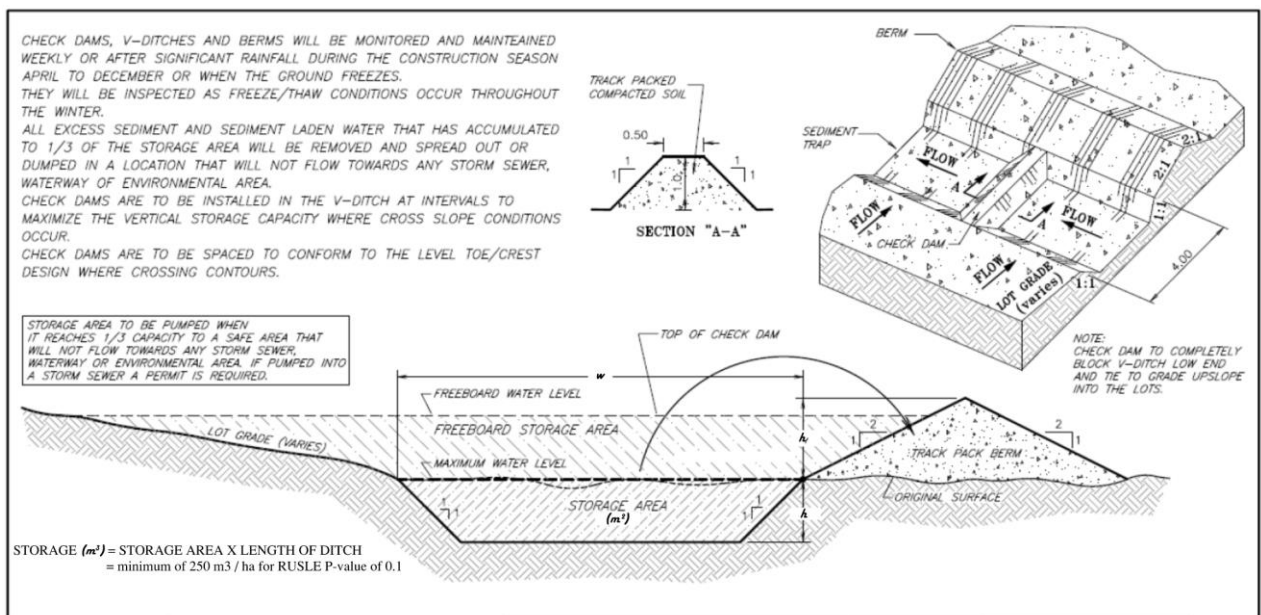
**Figure 6. Straw Wattle**



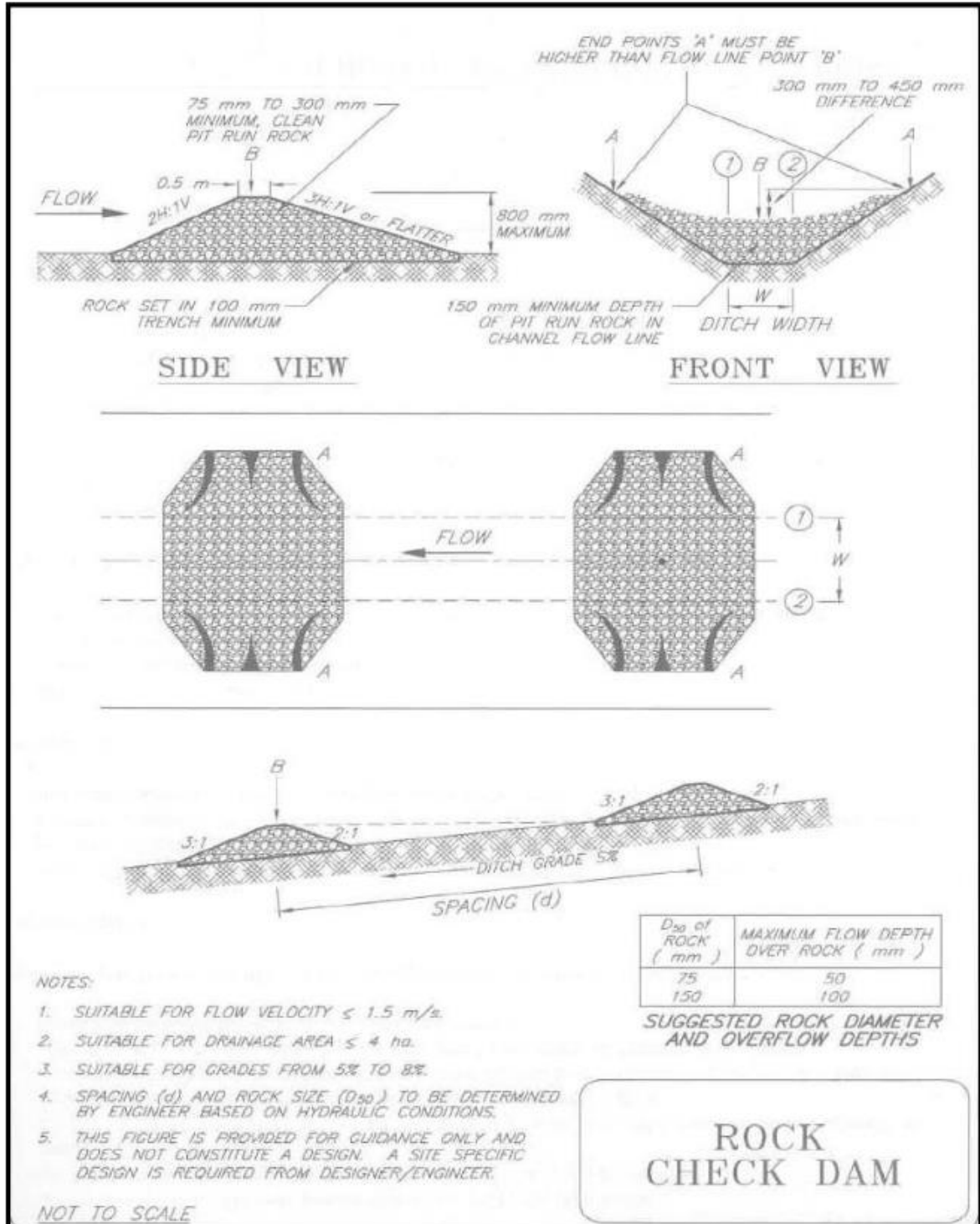
**Figure 7. Contour Furrowing**



**Figure 8. Ditches with Check Dams**



**Figure 9. Rock Check Dams**



## **SECTION VIII. REFERENCES**

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